Technical Information
Ti 006G/03/ae

FuelsManager® - Inventory Management Software

Supervisory Control and Data Acquisition (SCADA) suite for the Oil & Gas industry









Applications
FuelsManager (SCADA) software is specifically designed for operators of bulk storage facilities, marketing terminals, refineries and pipelines. It integrates all major types of tank level and mass measurement instruments into one system.

All measured and calculated tank parameters are accessible to your tank farm and terminal operators. Displays are fully configurable to meet your specific requirements. Each screen provides a graphical representation of your tank or tank farm that is easy to interpret and intuitive to use.

The SCADA functionality allows seamless integration of pumps, valves and PLCs with a minimum of hardware.

Extensive network capabilities offer the opportunity to have real-time data at any connected location for administrative and accounting purposes.

Features
- SCADA functionality: Supervisory control coupled with data acquisition for any tank gauging application
- Full API/ASTM compliant calculations assure accurate and real-time inventory data of your liquid hydrocarbon stock
- Windows based graphical user interface (GUI) gives world-wide acceptance and ease of use
- Standard "tank" object for ease of configuration with standard templates for various tank types
- Comprehensive alarm/event/reporting capabilities - daily alarm/event file logged to printer and hard disk
- Network capability (peer-to-peer, client/server) - system can expand with customer requirements
- Client/Server design - industry standard design for SCADA/DCS applications

Online
www.systems.endress.com

Endress+Hauser
Systems & Gauging

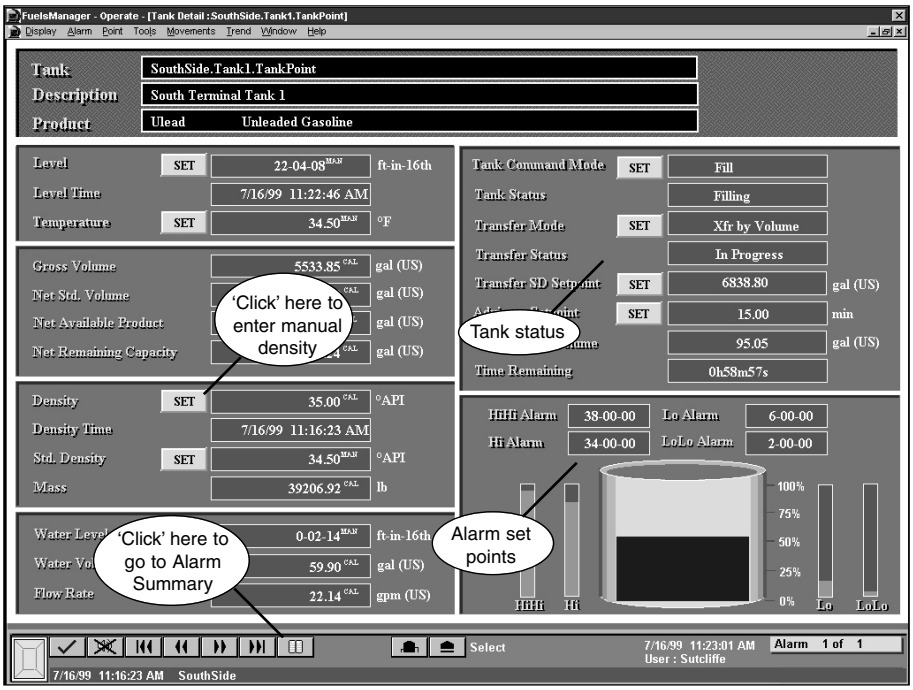
Operator Interface

Displays

FuelsManager provides real-time operational information on the status of your tank farm using both standard predefined and custom displays.

Tank Detail

FuelsManager includes several tank display templates. Each template shows tank data both graphically and alphanumerically. Data shown includes volumes, flows, density, alarms and product movement information. Custom templates can be created via FuelsManager's Draw utility, to display tank data in the required customer configuration.

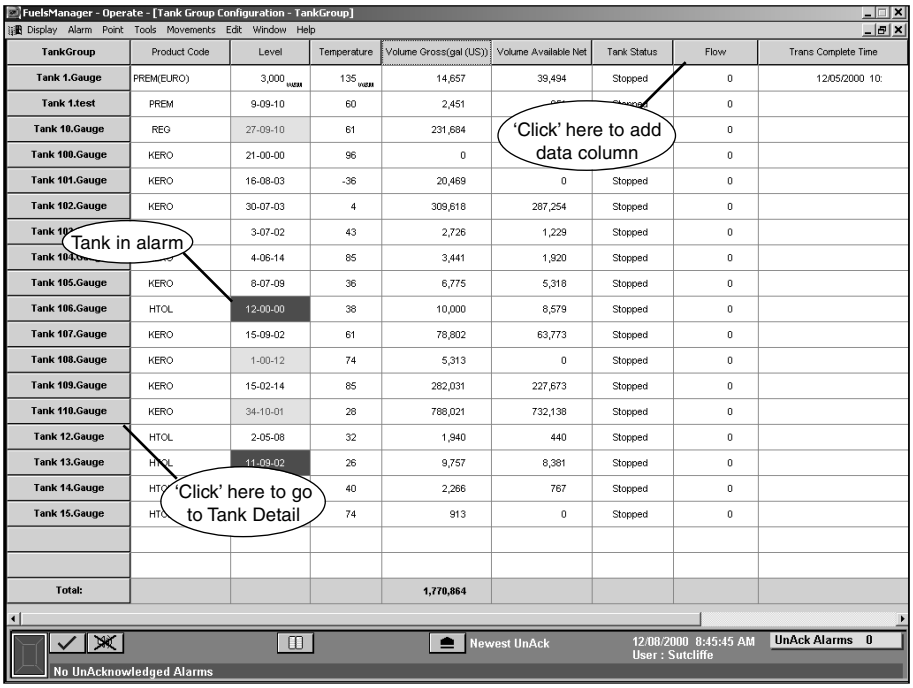


Example of a Tank Detail screen

Tank Groups

Tank groups can be created that display tabular tank data with up to 20 tanks per page. Operators or system administrators can create and modify tank groups in real-time and users may select or modify which tanks or tank data is displayed. Any number of tank groups can be saved within FuelsManager.

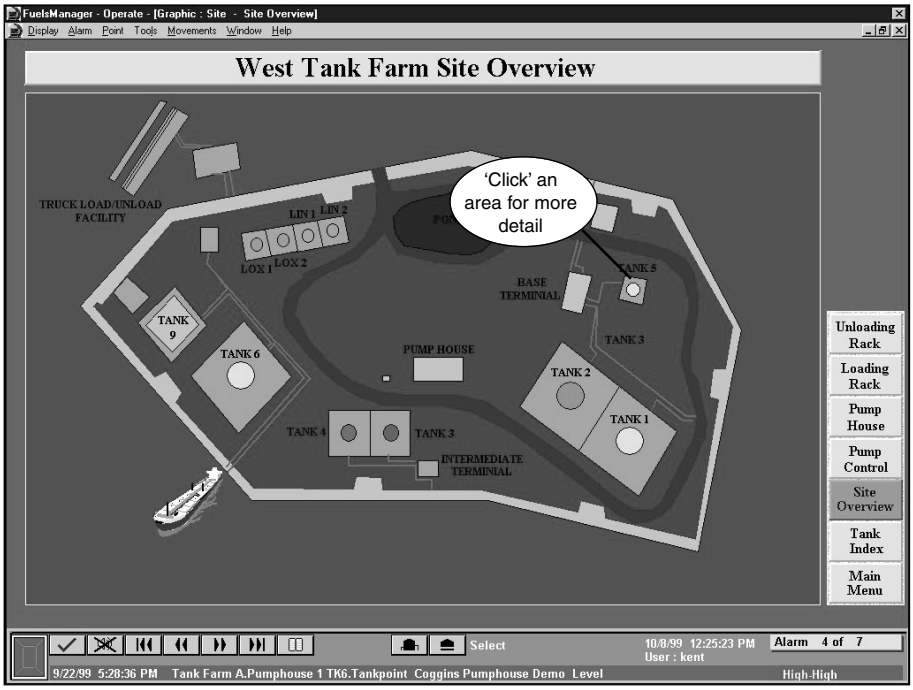
Alarm status is indicated on the tank group display. Individual tank details can be displayed by a single click of the mouse.



Example of a Tank Group screen

Site overview

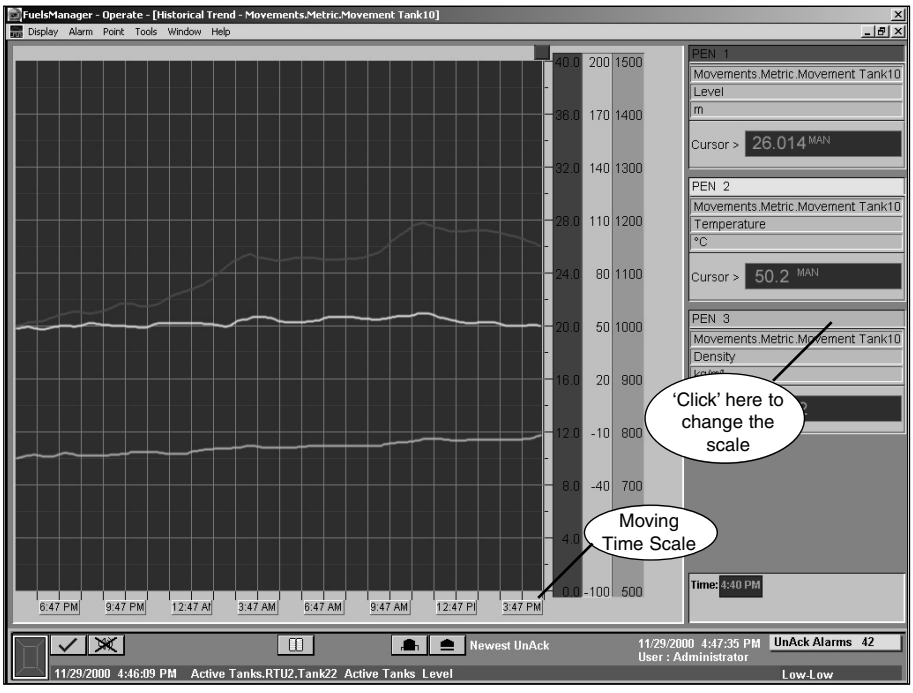
Custom site displays or site overviews can easily be created using tank icons or a digital image within FuelsManager's Draw utility. Site overview screens provide an entry to the entire site, allowing the user to access the tank detail screen by clicking on a particular tank.



Example of a Site Overview screen - Your site with your tanks

Trending

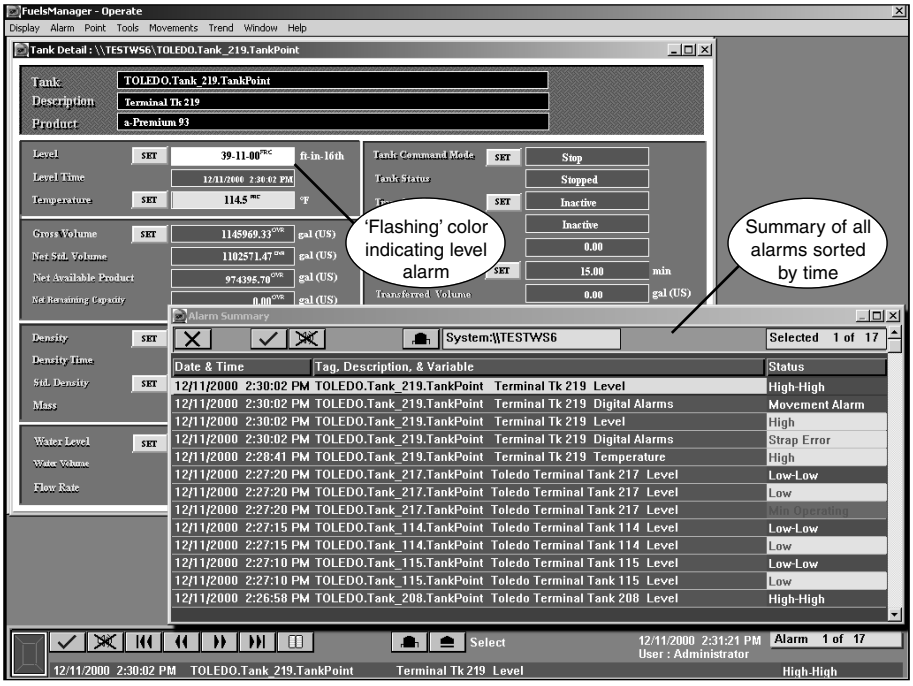
Both real-time and historical trending are available as a standard feature within FuelsManager. Up to 4 pens of data can be displayed per trend window. The data, process range, color and time scale can be selected per trend. Multiple trend windows can be opened simultaneously.



Example of a Trend screen

Alarming

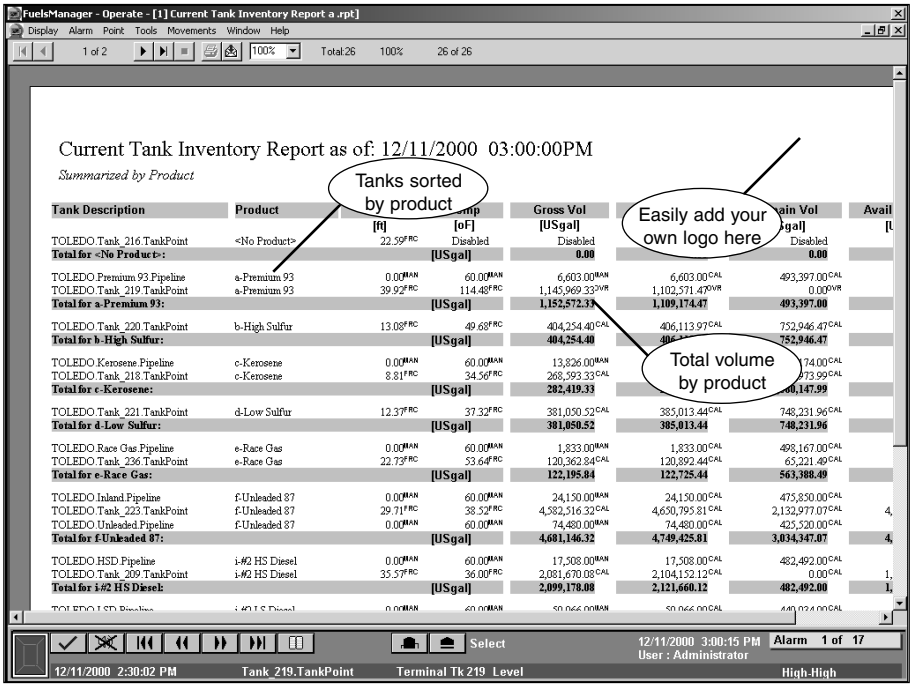
Alarm status is displayed both graphically and alphanumerically as alarm conditions occur. A fixed alarm line at the bottom of every display and a full window alarm summary show current alarm status. This includes the alarm, date and time, acknowledgement status and alarm priority. Alarms can be viewed as several operator selectable orders.



Example of a alarm condition, with Tank Detail and Alarm Summary windows showing

Reports

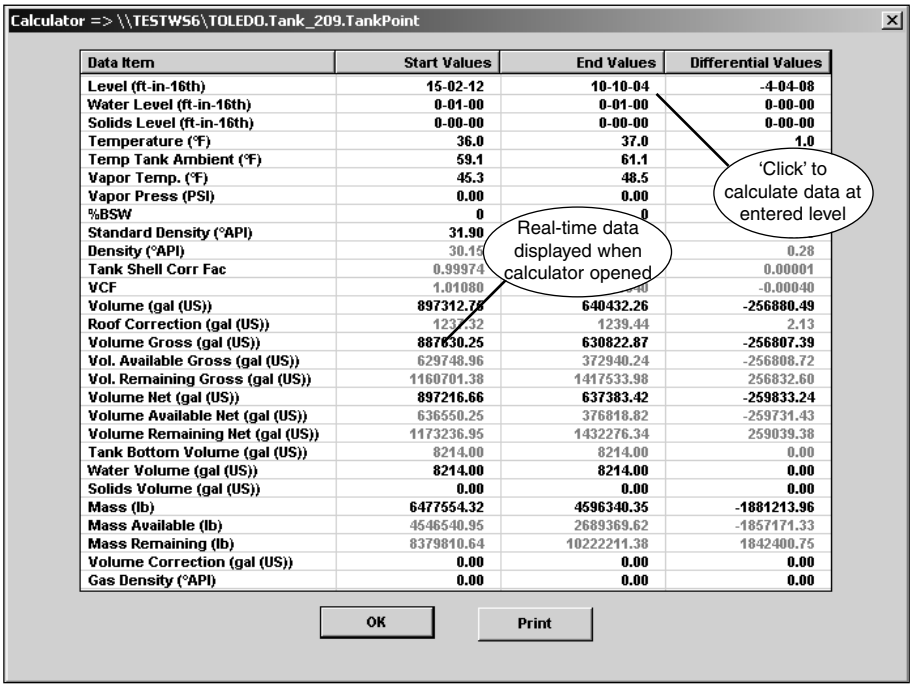
FuelsManager can display both real-time and historical report data. Standard or user configured reports can be previewed by the user, then printed either on demand or periodically. Historical reports are created using Seagate Software Crystal Reports™. The user may use the predefined historical reports or create custom reports using Crystal Reports™.



Report screen produced using Seagate Software Crystal Reports™

Calculator

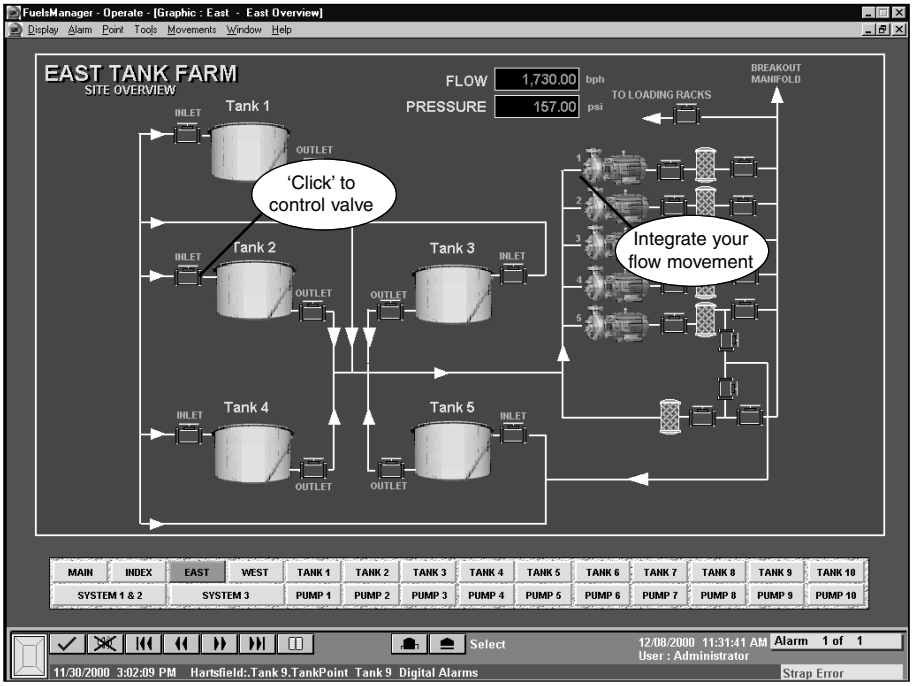
The tank calculator allows users to schedule and plan, based on “what if” scenarios. The operator can manually perform calculations, using current tank data, without changing any tank values, for example "what the level would be if he added 10,000 gallons" or " what volume would be at the high level limit".



Calculator Dialog box

Supervisory Control and Data Acquisition

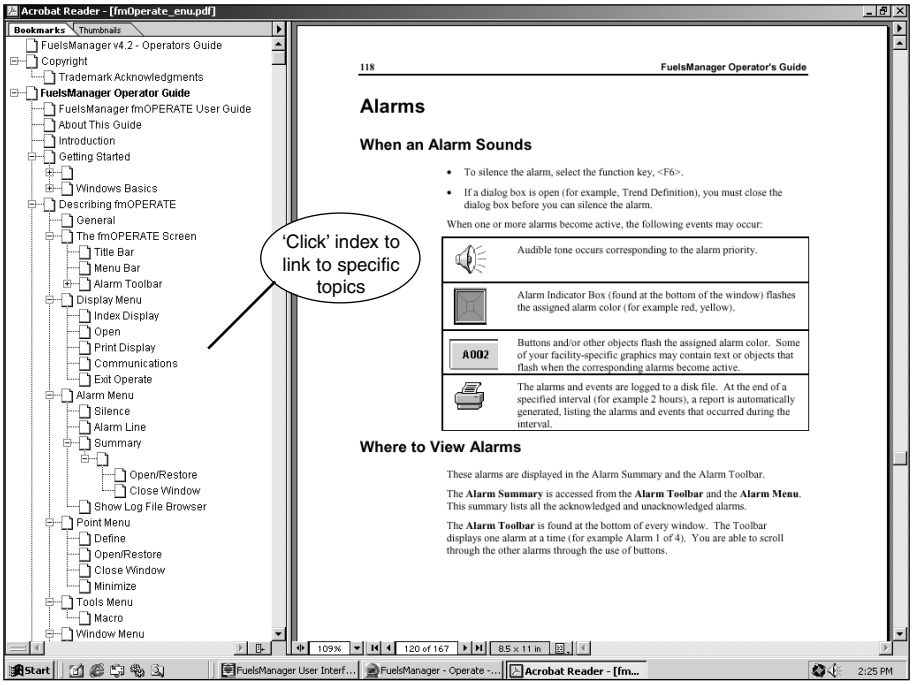
FuelsManager can provide SCADA functionality for equipment, such as pumps and valves, and also show pipe work. Displays typically show status and control of pumps and valves and indication of flow rates and pressure in pipes.



Example of a SCADA display

Help

FuelsManager includes on-line help for all functions and product features. The on-line documentation is in PDF format and can be viewed and printed while executing FuelsManager.



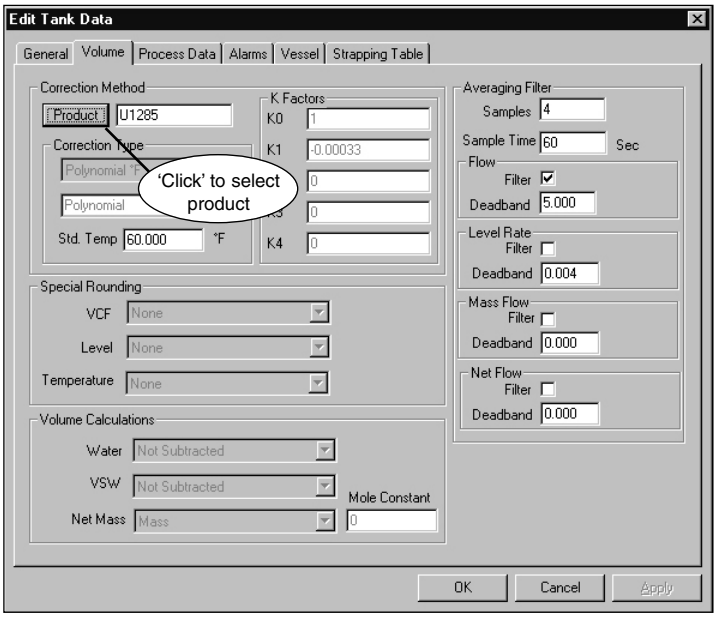
Example of a online help files with bookmarked links for ease of use

Configuration

Tank Object
The tank object is a central database point designed for configuration of all information associated with a tank. Process data, engineering units, strap tables, volume correction tables, alarms and tank geometry are all configured within the tank object.

Over 40 tank variables are automatically created for a tank and can be used to:
- connect to a field value
- calculate data from other values
- enter data manually

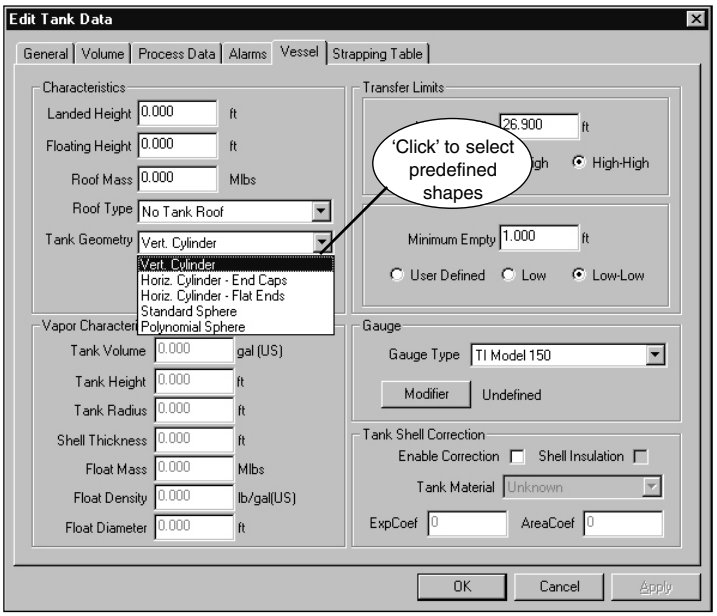
Variables defined in one set of engineering units may be displayed in alternate units in graphics, tank details and reports.



Tank Object configuration dialog box

Tank Geometry
Supported calculations include cone roof tanks, horizontal cylinders (with flat ends), bullets and spheres (both standard and polynomial). Tanks can either be configured with fixed roof or floating roof and calculations can include or exclude the floating roof mass in the strapping tables.

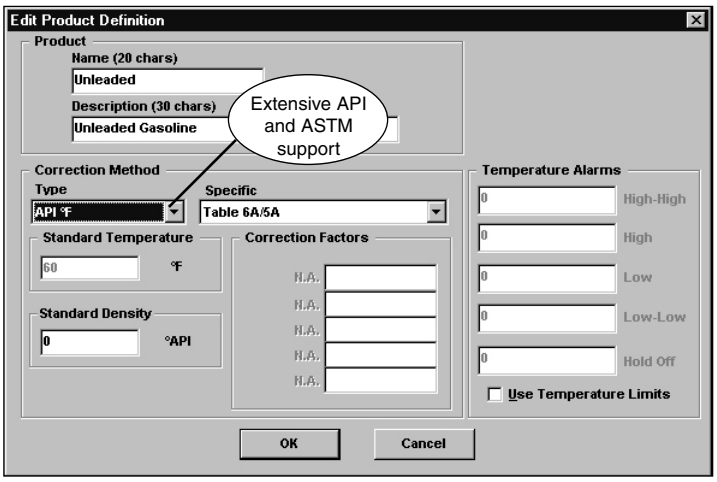
Minimum and maximum working levels can be set and are used to calculate available product and remaining tank capacity. Tank capacity tables (Strapping tables) may be innage or outage(ullage) with unlimited strap entries per tank.



Tank Geometry configuration dialog box

Product Database

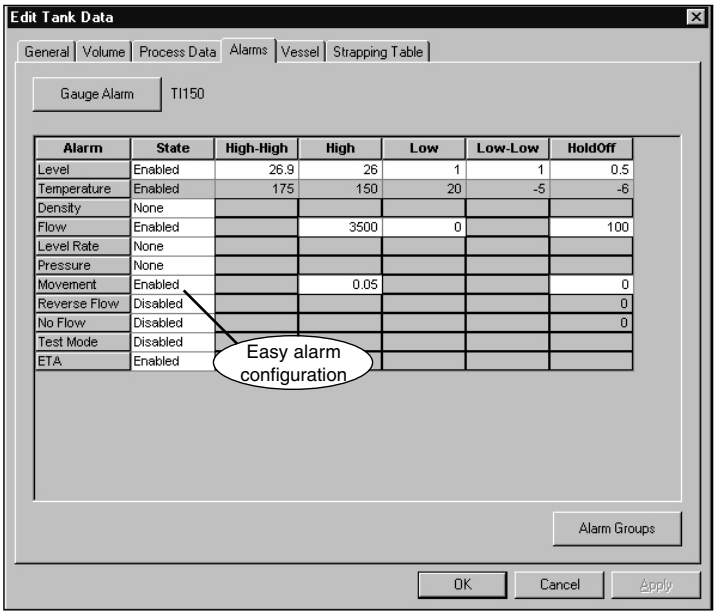
Configuration of products can include the assignment of standard density, description, calculation method, temperature alarms and calculation method. Assigning a product to a tank helps prevent unintentional mixing of products and with one operation all properties of a product are assigned to the tank.



Product database configuration dialog box

Alarms

Level, temperature, density, flow, level rate, pressure, movement, reverse flow, no flow and an estimated time of arrival (ETA) are predefined for all tanks. User security configuration makes it easy to restrict access to changing alarms.

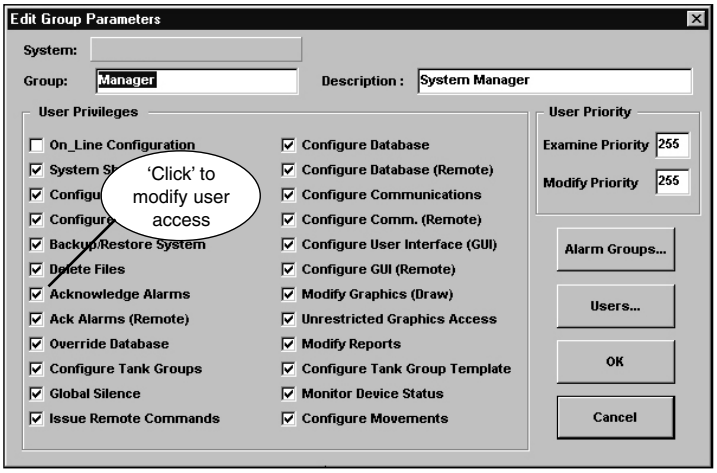


Alarm configuration dialog box

Security

FuelsManager user accounts make use of Windows NTFS file and object based security. 32 unique characteristics can be specified per user account that provide various levels of operation and controlled access for:

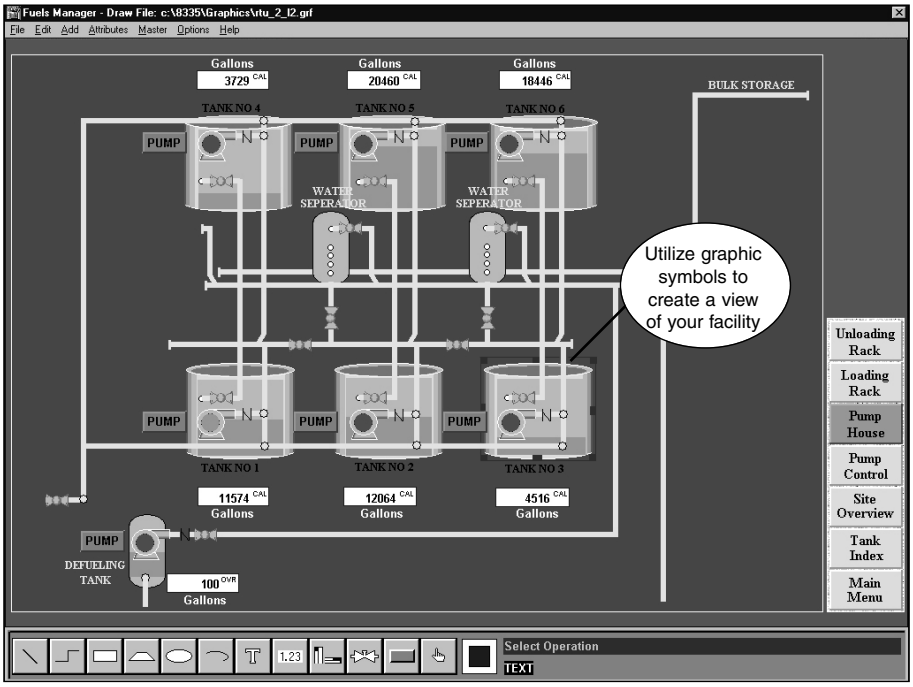
- Display and creation of real time graphics
- Modification of data base
- Operator commands
- Alarm acknowledgement
- Report creation



Security parameters dialog box

Draw

FuelsManager's Draw utility is used to create or modify custom displays and tank detail screens. The Draw utility contains a graphical symbol library that can be used in creating custom displays. Custom displays can be created or modified without the need to exit the operator interface program, shut down or restart the system.



Example of a custom display screen

FuelsManager Editions

The FuelsManager software suite is available as a licensed product with various levels of functionality. Each edition is available pre-installed on a PC or as a software license only.

Deliverables

The FuelsManager license (without PC) includes the following components:

- User and operator manual
- CD with files necessary to install the FuelsManager and ViewRTU software
- Software protection key

The FuelsManager license preinstalled onto a PC includes the following deliverables:

- PC with minimum required features for workstation or server editions
- User and operator manual
- CD with files necessary to install the FuelsManager and ViewRTU software
- Software protection key
- Windows NT/2000 license

FuelsManager Server

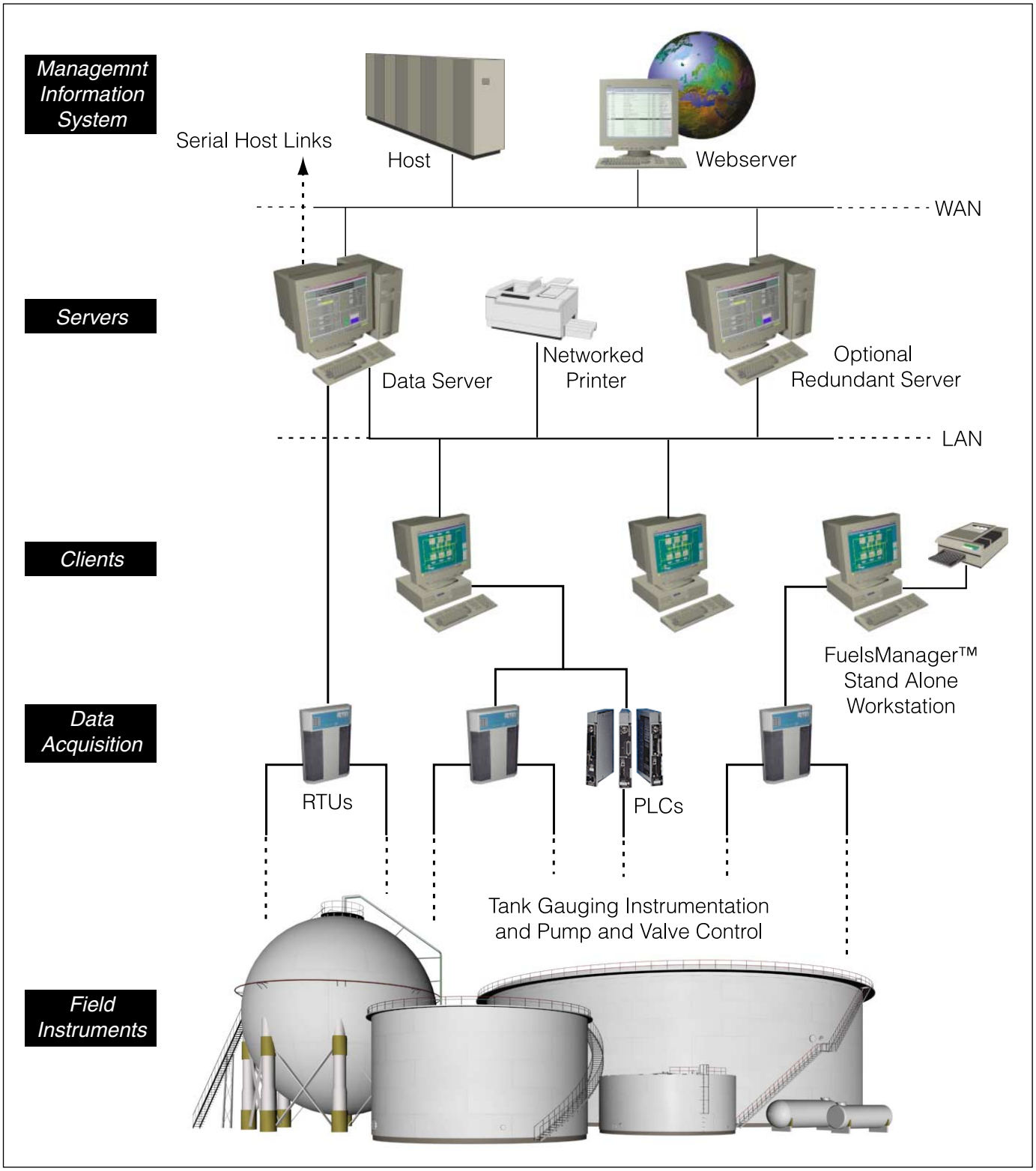
FuelsManager Server is the highest level of licensing and is intended for large installations where the customer wishes to purchase a single site license and then use multiple FuelsManager clients to access the data from a central data server. No additional licenses are required to connect FuelsManager workstations. PC platforms will be selected to best fit your site application and location.

FuelsManager Professional

FuelsManager Professional is intended for small to medium sized networks where the customer needs to be able to customize the operator interface and show data over a network. Each FuelsManager workstation on the network has its own licensing key. The FuelsManager Professional Edition can also act as a data server and provide inventory data to other FuelsManager Professional or Standard Editions.

FuelsManager Standard

FuelsManager Standard is intended for standalone systems for up to 30 tanks or as a client to a Professional or Server Edition. FuelsManager Standard Edition supports predefined graphics and reports, but does not allow these standards to be modified; custom graphics or reports cannot be created. FuelsManager Standard Edition cannot serve data to other FuelsManager stations and/or be used with the optional Product Movement Package. FuelsManager Standard and does not support SCADA functionality.



Example of FuelsManager system diagram

System Overview

The FuelsManager system consists of integrated client/server architecture of programs/modules that interact using the Windows NT operating system. FuelsManager operates on a single PC or as part of an unlimited network of workstations and server configurations.

FuelsManager runs as a Windows NT/2000 service, making critical data always available.

Communications Manager
Communications Manager handles all communications with field or host devices via a wide selection of communications device drivers. Complete configuration and diagnostic capabilities are available within Communications Manager.

Data Manager
Data Manager is the central repository for all real-time data. It performs all volume calculations and alarm/event processing.

Report Manager
Report Manager schedules automatic printing of FuelsManager standard and custom real-time reports.

Archive Manager
Archive Manager takes periodic snapshots of real time data and writes it to an ODBC compliant database.

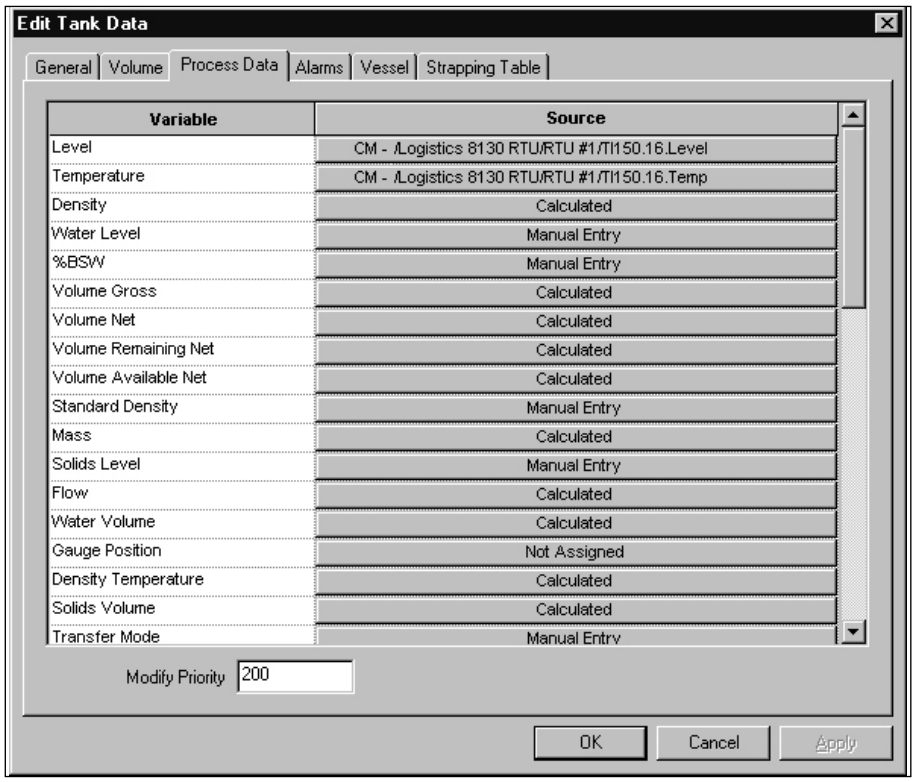
Connectivity

Tank Gauge
FuelsManager integrates all major types of tank level and mass measurement instruments into one system including:

- Float
- Radar
- Servo
- Hydrostatic
- Magnetostrictive
- Hybrid

FuelsManager measured and calculated tank parameter data includes:

- Level
- Temperature
- Gross and net standard volumes
- Density, standard and observed
- Water level
- Flow
- Mass



Most device connections to the system are configured through the process data dialog box

RTU
FuelsManager includes a highly optimized interface for connectivity to the Endress+Hauser RTU 8130. The RTU provides intelligent interface modules for connectivity to tank gauge field communications. In addition, digital, analog and pulse I/O capabilities exists within the RTU. The interface between the RTU and FuelsManager™ can utilize 2 communication ports on the RTU for redundant communications. The interface will also allow FuelsManager and ViewRTU, configuration and diagnostics software, to execute on the same communications link simultaneously.

PLC
FuelsManager supports interfaces to most major PLC manufacturers. This is achieved through specific device drivers or MODBUS® communications. Communications to PLCs provides pump and valve control and large quantities of I/O.

Host
FuelsManager supports host communications to DCS or MIS computer systems through specific device drivers or MODBUS® communications. Communications can utilize either standard RS-232, LAN or WAN connections.

OPC
FuelsManager includes an OPC client interface (OPC specification V2.0). The application of the OPC standard interface provides interoperability between automation/control applications, field systems/devices and business/office applications.

ODBC
FuelsManager's real-time data is written to an ODBC compliant database on a user defined periodic basis. This data is then available to other applications locally or via a network.

Additional Options

Application Extensions
Open architecture supports optional application modules to be added for specific requirements. Additional modules are available to cover specific applications not included in the Standard, Professional or Server Editions of FuelsManager.

FuelsManager Environmental
FuelsManager Environmental performs static analysis of the FuelsManager's archive database, providing leak analysis reports. It is capable of detecting leaks as small as 2 gpm.

Movement System
The movement system is able to track movements of product within the system and manage tank-to-tank transfers, charges, yields (rundowns), shipments, receipts, water drains and blends. Real-time operational alarms when setpoints are reached are also presented to the operator. All Movement System data is written to an ODBC compliant database.

Alarm Pager
The Alarm Pager module provides operators with a remote alarm paging facility. If a tank is in an alarm situation, Fuelsmanager will use network or cellular communications to page your operator with specific details of the alarm status, allowing them to respond quickly and efficiently to the situation.

FM Log
FuelsManager's FM Log application extension periodically writes the contents of selected tank point variables to a file, providing data to other applications. File options include CSV (comma separated variable) and HTML files. The user may select the time interval for update of data.

Custom Extensions
Custom application extensions can be developed without modifying the standard FuelsManager product. This can be done at any Endress+Hauser Systems & Gauging office. In addition, third party developers can utilize a FuelsManager Application Program Interface (API) to create custom application extensions.

Technical Data

Graphic Displays
- Multiple windows available for simultaneous real-time display
- Change of color and visibility based on field changes
- True Type scalable font capability
- Screen dump to color printer

User Configuration
- Ability to add data base points during graphics creation
- Graphics creation using symbol library
- Animated graphic and text colors based on system or field values
- Four alarm priorities supported, each with its own color and audible attributes
- 16 alarm groups supported
- Animation based on eight different alarm conditions
- User notified of alarms regardless of which display is active

Parameters
- Alarms
- Level
- Temperature
- Density
- Flow
- Level rate of change
- Pressure
- Movement
- Reverse flow
- No flow
- Estimated time of arrival (setpoint ETA)

Alarm Summary
- User sizable alarm summary window
- Alarm summary pages supported
- Alarms logged to file for future reference
- Alarms keyed to user graphic

Events
- User selectable printout of each event change
- User selectable log to file of each event change

Real-Time and Historical Trending
- Support of up to four pens per trend display, user configurable scaling, colors and width
- Historical reports
- Trend continues to update when not displayed

Reporting
- Predefined real-time & historical reports
- Standard or user configured reports
- Reports may be scheduled periodically or on demand
- Supports Seagate Software Crystal Reports®

Networking
- Support Peer-To-Peer and Client Server Local Area Networks (LAN) and Wide Area Networks (WAN)

Redundancy
- FuelsManager can be installed on redundant servers for support of automatic and manual switchover

Connectivity
Slave modules
- MODBUS® Slave module
- MTU77 Slave module
- OSI Software, Plant Information (PI)
- PROSS II Slave module

Master modules
- Master module-8130/RTU
- MODBUS® master
- MODBUS® master for Varec devices
- Whessoe Bus
- Varec TSU
- Dumb terminal
- Veeder Root TLS 35x

Units of Measure
Engineering units for tank variables, input and output (in metric and US units), can be selected for various measuring applications

- Density - 20 to choose from including: degrees API, kilogram/cubic meter, kilogram/liter, pounds/gallon or grams/cubic centimeter
- Flow - both volumetric and mass flow units can be supported in variations of units per second, minute, hour or day
- Length: millimeter, meter, feet, inch, feet-inch-16th, feet-inch-8th
- Mass: from kilogram, metric tonnes, pounds and English, short and long ton
- Pressure - over 15 units including: Pascals, pounds/square inch, kilograms/square centimeter, feet or inch water (H_2O), Bar and millibar
- Temperature: degrees Centigrade, degrees Fahrenheit
- Volumes - cubic centimeters, cubic inch and cubic feet, oil barrels, liquid barrels, US gallons, imperial gallons, liter and kiloliter

Volume calculations
FuelsManager can calculate the following data:
- Reference density
- Total observed volume
- Gross observed volume
- Floating roof adjustment
- Net standard volume
- Mass
- Available volume / available mass
- Remaining volume / remaining mass
- Water volume
- Flow

Fuelsmanager compensates for variations in temperature using:
- Volume correction factor (VCF)
- Compensation for Tank Shell temperature (CTSh)

CTSh
- Volume correction based on temperature of tank shell
- Single temperature sensor can be assigned to all tanks

Volume Correction Methods

API/ASTM D 1280 (1989) and (1980)

- Tables 5/6 (A, B, C & D)
- Tables 53/54 (A, B, C & D @ 15 and 30 °C)
- Tables 60 (A, B & D) @ 20 °C

GPA TP25

- Table 23/24E

JIS 2249 (1980)

- Table 53/54 (A, B, C & D @ 15 and 30 °C)
- Table 60 (A, B & C @ 20 °C)

JIS 2250 (1967)

- Table 2 (54)

ASTM 1250

- Table 55
- Table 54A (6X)
- Table 54B (6X)

ASTM D1555 (°C and °F)

Special rounding factors can be applied to certain calculations for VCF, level and volume including:

- Water volume subtracted from gross or net volume or based on selected standards
- Bottom S&W subtracted or included from strap volume
- Mass calculations optionally may include vapor mass

FuelsManager accommodates a fourth order polynomial for chemicals and specialized products to obtain a Volume Correction factor (VCF).

Languages Supported

FuelsManager is available in English and Japanese. Operator versions are available in French, German, Spanish and simplified Chinese. Custom graphics, tank details and reports can also be configured in other languages. Languages other than English may require local specific versions of Windows NT/2000.

Product Structure

FuelsManager Data Acquisition

E	Standard Edition
L	Standard Edition license only - no PC
P	Professional Edition license only - no PC
S	Professional Edition license with a PC Server
W	Professional Edition license with a PC Workstation
F	Server site license Edition

N9000 [ ] product designation

FuelsManager Application Extensions

Application Extension

F	FM Log application
L	LeakManager application
M	Movement System

N9001 [ ] product designation

FuelsManager Communication Modules

Slave Module

S1	MODBUS® Slave module
S2	MTU77 Slave module
S3	OSI Software, Plant Information (PI)
S4	PROSS II Slave module Master module
M1	Master module-8130/RTU
M2	MODBUS® Master (Varec Devices)
M3	MODBUS® Master (Generic, Sakura)
M4	Whessoe Bus Master
M5	Varec TSU Master
M6	Dumb Terminal Master
M7	Veeder Root Master PLC module
P2	Allen Bradley PLC (Via RSLinx-RS232)
P3	Allen Bradley PLC (RSLinx-KT Card-DH+)
P4	AEG PLC

N9002 [ ] product designation

* Contact the factory for information on Environmental or Aviation Editions.

FuelsManager® is a registered trademark of
Endress+Hauser Systems & Gauging, Inc.

Supplementary Documentation

- ❑ FuelsManager Data Acquisition System Information Si 006G/03/ae
- ❑ RTU 8130 Remote Terminal Unit System Information Si 007G/03/ae
- ❑ RTU 8130 Remote Terminal Unit Technical Information Ti 007G/03/ae
- ❑ For documentation covering the various module and communication interface options available, please contact an Endress+Hauser Systems & Gauging Representative.

Locations

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